CASE REPORT

Use of emergency department point-of-care ultrasound in a case of cholecystitis

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SUMMARY

A 54-year-old man presented with severe right upper quadrant (RUQ) abdominal pain. He denied any infective symptoms. On clinical examination, he was afebrile and anicteric. His abdomen was soft with tenderness elicited on the RUQ. A point-of-care ultrasound in the emergency department demonstrated a distended gallbladder with a thickened wall and an impacted large gallstone at the neck of the gallbladder. Furthermore, the point-of-care ultrasound also identified a highly reflective echo from the anterior surface of the gallstone and marked posterior acoustic shadowing. A diagnosis of cholecystitis was made after confirmatory ultrasonography performed in the radiology department. The patient had a cholecystostomy performed under interventional radiology and was managed with course of intravenous antibiotics for 7 days. He was discharged from hospital with an elective cholecystectomy planned to be performed 8 weeks posthospital discharge.

BACKGROUND

Point-of-care ultrasound performed by emergency physicians can be useful to evaluate patients with undifferentiated right upper quadrant (RUQ) pain. In the case presented, it was used to diagnose a patient with an impacted large gallstone at the neck of the gallbladder.

CASE PRESENTATION

A 54-year-old man presented with severe RUQ pain. He denied any infective symptoms. On clinical examination, he was afebrile and there was no evidence of jaundice. His abdomen was soft, and tenderness was elicited on palpation of his RUQ.

INVESTIGATIONS

His initial baseline laboratory investigations including full blood count, C reactive protein and liver function tests were normal. A point-of-care ultrasound was performed in the emergency department by an emergency physician (NL) using a SonoSite Edge machine. This demonstrated a distended gallbladder with a thickened wall. There was a large gallstone impacted at the neck of the gallbladder with a highly reflective echo from the anterior surface and demonstrated marked posterior acoustic shadowing (figure 1). The gallstone was non-mobile on dynamic movement of the patient and the patient also displayed sonographic Murphy's sign.

An ultrasound performed in the radiology department later that day confirmed a 1.9 cm non-mobile calculus at the neck of the gallbladder (figure 2) with multiple stones and sludge within the gallbladder lumen. This correlated well with the point-of-care ultrasound findings. The common bile duct measured 0.7 cm in diameter, but there was mild intrahepatic duct dilation (figure 3).

The patient was admitted under the surgical team on call. As an inpatient, his RUQ severe pain persisted and he developed signs of sepsis. His C reactive protein increased to a maximum level of 334 mg/L, but his liver function tests remained within normal range. He was treated with intravenous piperacillin/tazobactam and gentamicin for 7 days after he developed signs of sepsis.

DIFFERENTIAL DIAGNOSIS

Based on the history and clinical findings, an initial differential diagnosis of cholelithiasis and cholecystitis was made.

TREATMENT

A cholecystostomy was performed by interventional radiology using procedural sedation (midazolam and fentanyl) and local anaesthetic (1% lignocaine). Access to the gallbladder was obtained by transperitoneal subcostal approach using a one-step access under ultrasound guidance. Contrast was injected, confirming proper access in the gallbladder. A Rosen guidewire was admitted to the gallbladder, followed by dilation. A 10Fr uresil general purpose (GP™) catheter was subsequently sited over the wire under fluoroscopic control, with the loop formed within the gallbladder. A volume of 70 cm³ of pus was aspirated. No complications were observed.

Magnetic resonance cholangiopancreatography (MRCP) performed shortly after the cholecystostomy confirmed: the large gallstone in the gallbladder neck with evidence of acute cholecystitis; the cholecystostomy in a satisfactory position and the large gallstone causing external compression of the common hepatic duct with mild intrahepatic biliary duct dilation (figure 4). No cholecystobiliary fistula was documented on the MRCP.

OUTCOME AND FOLLOW-UP

The patient clinically improved post the cholecystostomy and course of intravenous antibiotics. He was discharged from hospital with an elective

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Figure 1 Point-of-care ultrasound image depicting a distended gallbladder with a thickened wall. A highly reflective echo from the anterior surface of the gallstone and marked posterior acoustic shadowing is also evident.

cholecystectomy planned to be performed 8 weeks posthospital discharge.

DISCUSSION

This case demonstrates the use of point-of-care ultrasound performed by an emergency physician to identify an impacted gallstone at the neck of the gallbladder in the setting of acute cholecystitis.

In this case as the patient developed sepsis, a preoperative cholecystostomy performed by interventional radiology served as an adjunct prior to allow resolution of acute inflammation prior to the planned surgery. This technique of interim percutaneous cholecystostomy prior to definitive cholecystectomy has been described as a treatment option to allow resolution of sepsis in patients at high surgical risk.¹⁻³ It is acknowledged that cholecystostomy procedures can be associated with bile leaks, haemorrhage and duodenal fistulas and careful selection of cases is required.⁴

Mirizzi described a syndrome of hepatic duct obstruction in the context of cholelithiasis and cholecystitis.⁵ However, it was not possible to diagnose Mirizzi's syndrome in this case as all the typical findings of dilated intrahepatic biliary radicals with proximal dilatation of common hepatic duct above the level of

Figure 2 An ultrasound performed in the radiology department confirmed a 1.9 cm non-mobile calculus at the neck of the gallbladder.

Figure 3 Ultrasound image demonstrating mild dilation of the common bile duct (0.7 cm in diameter) and the intrahepatic ducts.

impacted stone and normal or collapsed bile duct below the cystic duct/common bile duct junction are not seen.⁶ Furthermore, the incidence of Mirizzi's syndrome is low being present in 1% of all cholecystectomies and 0.1% of all patient's diagnosed with gall stones.^{7,8} As the Mirizzi's is not of frequent occurrence, it is challenging to diagnose accurately in the emergency department.

The use of point-of-care ultrasonography in this case suggests that the concept of an 'ultrasound stethoscope' is rapidly moving from theory to reality as acknowledged by the American Institute of Ultrasound in Medicine.⁹ This is a case of where point-of-care ultrasonography in the emergency department was used to identify an impacted gallstone at the neck of the gallbladder in the setting of acute cholecystitis. Despite the low sensitivity, ultrasonography is the best initial diagnostic test as it offers many advantages to the emergency medicine clinician for detection of gallstones: non-invasiveness, lack of ionising radiation, relatively low cost and the ability to evaluate adjacent structures, for example, abdominal aorta.^{10,11} The characteristic findings of

Figure 4 Magnetic resonance cholangiopancreatography performed shortly after the cholecystostomy confirming the cholecystostomy in a satisfactory position and the large gallstone causing external compression of the common hepatic duct with mild intrahepatic biliary duct dilation.

gallstones on ultrasound are a highly reflective echo from the anterior surface of the gallstone, mobility of the gallstone (if not impacted) on repositioning the patient and marked posterior acoustic shadowing.¹⁰ Further confirmatory imaging such as CT, MRCP and/or endoscopic retrograde cholangiopancreatography should always be ordered as indicated following point-of-care ultrasonography to confirm diagnosis.

Learning points

- Point-of-care ultrasound performed by emergency physicians can be useful to evaluate patients with undifferentiated right upper quadrant pain.
- The characteristic findings of gallstones at ultrasonography are a highly reflective echo from the anterior surface of the gallstone and marked posterior acoustic shadowing.
- Further confirmatory imaging should always be ordered as indicated following point-of-care ultrasonography to confirm diagnosis.

Contributors NL was involved in the data acquisition and drafting of the manuscript. AM participated in the drafting, revising and conception of the manuscript. JC participated in the revising of the manuscript.

Competing interests None declared.

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